

CLAIMS

1. A mobile handset comprising

- 5 - a handset housing comprising a front and a back cover,
- display means being visible from the front cover side of the handset housing, the display means being adapted to provide visual information to a user of the mobile handset, and
- 10 - a plurality of loudspeakers being adapted to generate audio signals; wherein each of the plurality of loudspeakers comprises a magnetic circuit comprising a magnet, the magnetic circuit having at least one gap defined between two opposed and substantially parallel surfaces of the magnetic circuit, the magnet of
- 15 the magnetic circuit causes a magnetic field to exist across the at least one gap,

wherein the magnetic circuit defines magnetic return paths completely encircling the gap.

- 20 2. A mobile handset according to claim 1, further comprising image compensation means so as to allow the mobile handset to be applied in near-to-the-eye applications.

3. A mobile handset according to claim 1, wherein the display means is a colour display, such as a LCOS display.

- 25 4. A mobile handset according to claim 1, wherein the plurality of loudspeakers are arranged within the handset housing so that the audio signals are transmitted from the front cover of the handset housing.

5. A mobile handset according to claim 4, wherein the plurality of loudspeakers comprise loudspeaker front covers each having at least one acoustic opening arranged so that the audio signals are transmitted primarily in a direction being perpendicular to a mean plane defined by the loudspeaker front cover.
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6. A mobile handset according to claim 1, wherein the plurality of loudspeakers are arranged within the handset housing so that the audio signals are transmitted from a side of the handset housing.
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7. A mobile handset according to claim 6, wherein the plurality of loudspeakers comprise loudspeaker front covers each having at least one acoustic opening arranged so that the audio signals are transmitted primarily in a direction being parallel to a mean plane defined by the loudspeaker front cover.
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8. A mobile handset according to claim 1, wherein two loudspeakers are arranged at two opposing sides of the display means.
9. A mobile handset according to claim 8, wherein a third speaker is positioned between the two oppositely arranged loudspeakers and at a third side of the display means.
10. A mobile handset according to claim 1, wherein each of the plurality of loudspeakers comprises a number of loudspeaker units, each loudspeaker unit comprising at least one movable diaphragm.
11. A mobile handset according to claim 1, further comprising means for controlling a pointer shown on the display means.
12. A mobile handset according to claim 11, wherein the control means comprises a navigation key accessible from the back cover side of the handset housing, the navigation key being capable of providing two-dimensional control of the pointer shown on the display means.
13. A mobile handset according to claim 12, wherein the navigation key is capable of selecting information displayed on the display means upon moving the navigation key from an initial position to a select position.
14. A mobile handset according to claim 13, wherein the navigation key is moved from the initial position to the select position by applying a pressure to the navigation key in a direction towards the back cover of the handset housing.
15. A mobile handset according to claim 1, further comprising vibration means so as to mechanically vibrate the mobile handset in accordance with a vibration signal provided to the vibration means.
16. A mobile handset according to claim 1, further comprising a number of drivers for driving the loudspeaker.
17. A mobile handset according to claim 16, wherein the number of driver comprises a number of class D drivers.
18. A mobile handset according to claim 16, further comprising an electronic decoding circuit for decoding a received digital signal into two or more driver signals, each driver signal being provided to a loudspeaker via at least one driver.

19. A mobile handset according to claim 1, further comprising means for enhancing the stereo reproduction.

20. A mobile handset according to claim 19, wherein the means for enhancing the stereo reproduction comprises cross talk cancellation.

21. A mobile handset according to any claim 1, wherein the mobile handset is a mobile phone, a PDA, or a portable game device.

22. A mobile handset comprising

- a handset housing comprising a front and a back cover,
- a plurality of loudspeakers being adapted to generate audio signals,
- display means being visible from the front cover side of the handset housing, the display means being adapted to provide visual information to a user of the mobile handset, and
- image compensation means so as to allow the mobile handset to be applied in near-to-the-eye applications.

23. A mobile handset according to claim 22, wherein each of the plurality of loudspeakers comprises a magnetic circuit comprising a magnet, the magnetic circuit having at least one gap defined between two opposed and substantially parallel surfaces of the magnetic circuit, the magnet of the magnetic circuit causes a magnetic field to exist across the at least one gap, and wherein the magnetic circuit defines magnetic return paths completely encircling the gap.

24. A mobile handset according to claim 22, wherein the display means is a colour display, such as a LCOS display.

25. A mobile handset according to claim 22, wherein the plurality of loudspeakers are arranged within the handset housing so that the audio signals are transmitted from the front cover of the handset housing.

26. A mobile handset according to claim 25, wherein the plurality of loudspeakers comprise loudspeaker front covers each having at least one acoustic opening arranged so that the audio signals are transmitted primarily in a direction being perpendicular to a mean plane defined by the loudspeaker front cover.

27. A mobile handset according to claim 22, wherein the plurality of loudspeakers are arranged within the handset housing so that the audio signals are transmitted from a side of the handset housing.
- 5 28. A mobile handset according to claim 27, wherein the plurality of loudspeakers comprise loudspeaker front covers each having at least one acoustic opening arranged so that the audio signals are transmitted primarily in a direction being parallel to a mean plane defined by the loudspeaker front cover.
- 10 29. A mobile handset according to claim 28, wherein two loudspeakers are arranged at two opposing sides of the display means.
30. A mobile handset according to claim 29, wherein a third speaker is positioned between the two oppositely arranged loudspeakers and at a third side of the display
15 means.
31. A mobile handset according to claim 22, wherein each of the plurality of loudspeakers comprises a number of loudspeaker units, each loudspeaker unit comprising at least one movable diaphragm.
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32. A mobile handset according to claim 22, further comprising means for controlling a pointer shown on the display means.
33. A mobile handset according to claim 32, wherein the control means comprises a
25 navigation key accessible from the back cover side of the handset housing, the navigation key being capable of providing two-dimensional control of the pointer shown on the display means.
34. A mobile handset according to claim 33, wherein the navigation key is capable of
30 selecting information displayed on the display means upon moving the navigation key from an initial position to a select position.
35. A mobile handset according to claim 34, wherein the navigation key is moved from the initial position to the select position by applying a pressure to the navigation key
35 in a direction towards the back cover of the handset housing.
36. A mobile handset according to claim 22, further comprising vibration means so as to mechanically vibrate the mobile handset in accordance with a vibration signal provided to the vibration means.
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37. A mobile handset according to claim 22, further comprising a number of drivers for driving the loudspeaker.

38. A mobile handset according to claim 37, wherein the number of driver comprises a number of class D drivers.

39. A mobile handset according to claim 37, further comprising an electronic decoding
5 circuit for decoding a received digital signal into two or more driver signals, each driver signal being provided to a loudspeaker via at least one driver.

40. A mobile handset according to claim 22, further comprising means for enhancing
10 the stereo reproduction.

41. A mobile handset according to claim 40, wherein the means for enhancing the stereo reproduction comprises cross talk cancellation.

42. A mobile handset according to claim 22, wherein the mobile handset is a mobile
15 phone, a PDA, or a portable game device.

43. A display and audio assembly for mobile handsets, the display and audio assembly comprising

20 - display means adapted to provide visual information,

- a plurality of loudspeakers being adapted to generate audio signals, wherein each of the plurality of loudspeakers comprises a magnetic circuit comprising a magnet, the magnetic circuit having at least one gap defined between two opposed and substantially parallel surfaces of the magnetic circuit, the magnet of the magnetic circuit causes a magnetic field to exist across the at least one gap,
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wherein the magnetic circuit defines magnetic return paths completely encircling the
30 gap.

44. An assembly according to claim 43, further comprising image compensation means so as to allow the assembly to be applied in near-to-the-eye applications.

45. An assembly according to claim 43, wherein the display means is a colour display,
35 such as a LCOS display.

46. An assembly according to claim 43, wherein two loudspeakers are arranged at two opposing sides of the display means.

40 47. An assembly according to claim 46, wherein a third speaker is positioned between the two oppositely arranged loudspeakers and at a third side of the display means.

48. An assembly according to claim 43, wherein each of the plurality of loudspeakers comprises a number of loudspeaker units, each loudspeaker unit comprising at least one movable diaphragm.

5 49. An assembly according to claim 43, further comprising means for controlling a pointer shown on the display means.

50. An assembly according to claim 49, wherein the control means comprises a navigation key, the navigation key being capable of providing two-dimensional control of
10 the pointer shown on the display means.

51. An assembly according to claim 50, wherein the navigation key is capable of selecting information displayed on the display means upon moving the navigation key from an initial position to a select position.
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52. An assembly according to claim 43, further comprising a number of drivers for driving the loudspeaker.

53. An assembly according to claim 52, wherein the number of driver comprises a
20 number of class D drivers.

54. An assembly according to claim 52, further comprising an electronic decoding circuit for decoding a received digital signal into two or more driver signals, each driver signal being provided to a loudspeaker via at least one driver.
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55. A display and audio assembly for mobile handsets, the display and audio assembly comprising

30 - display means adapted to provide visual information,

- image compensation means so as to allow the display and audio assembly to be applied in near-to-the-eye applications, and

35 - a plurality of loudspeakers being adapted to generate audio signals.

56. A display and audio assembly according to claim 55, wherein each of the plurality of loudspeakers comprises a magnetic circuit comprising a magnet, the magnetic circuit having at least one gap defined between two opposed and substantially parallel surfaces of the magnetic circuit, the magnet of the magnetic circuit causes a magnetic
40 field to exist across the at least one gap, and wherein the magnetic circuit defines magnetic return paths completely encircling the gap.

57. An assembly according to claim 55, wherein the display means is a colour display, such as a LCOS display.
58. An assembly according to claim 55, wherein two loudspeakers are arranged at two
5 opposing sides of the display means.
59. An assembly according to claim 58, wherein a third speaker is positioned between the two oppositely arranged loudspeakers and at a third side of the display means.
- 10 60. An assembly according to claim 55, wherein each of the plurality of loudspeakers comprises a number of loudspeaker units, each loudspeaker unit comprising at least one movable diaphragm.
61. An assembly according to claim 55, further comprising means for controlling a
15 pointer shown on the display means.
62. An assembly according to claim 61, wherein the control means comprises a navigation key, the navigation key being capable of providing two-dimensional control of the pointer shown on the display means.
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63. An assembly according to claim 62, wherein the navigation key is capable of selecting information displayed on the display means upon moving the navigation key from an initial position to a select position.
- 25 64. An assembly according to claim 55, further comprising a number of drivers for driving the loudspeaker.
65. An assembly according to claim 64, wherein the number of driver comprises a number of class D drivers.
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66. An assembly according to claim 64, further comprising an electronic decoding circuit for decoding a received digital signal into two or more driver signals, each driver signal being provided to a loudspeaker via at least one driver.